

ties in this country is too pressing a need to be dependent upon party politics. Unless our statesmen can be made to realise the supreme importance of this matter and be persuaded to deal with it in a patriotic manner, generously and expeditiously, as if there were no votes to retain or secure, we must reconcile ourselves to the idea that as a manufacturing and distributing people we shall in due course have to occupy a third or fourth place among the nations of the world. In Germany, the United States, and now in Japan rulers have learnt the lesson that efficient education and industrial success are related to each other as cause and effect; and, moreover, they appear to be supported by an enlightened public opinion.

If our statesmen refuse to lead, we must make every effort to educate the voters of the country to realise the certain results of a policy of drift from which the most important of our national questions—so far as the future welfare of the British Empire is concerned—is suffering. If, meanwhile, our present supremacy is lost, it will not be because men of science have failed to warn their countrymen of the scientific spirit and energy which are yearly increasing the industrial efficiency of our great competitors.

NOTES.

ON the day of going to press we learn of the death of Lord Kelvin, an announcement which will be received with deep sorrow throughout the civilised world. To men of science, Lord Kelvin's achievements in the realm of scientific thought and discovery have long been familiar; and thirty-one years ago, in *NATURE* of September 7, 1876 (vol. xiv.), his remarkable contributions to natural knowledge were described in our Scientific Worthies series, of which he was then the subject. His death is a loss to science which only scientific workers can adequately realise. The world has to deplore the departure of a brilliant and inspiring figure; while science mourns that a leader whose influence has stimulated progress in many directions during a remarkable period has passed into stillness. For the body of one who has brought such honour to the British nation, the only appropriate place of burial is Westminster Abbey. We trust that steps will be taken at once to secure this mark of national recognition of the greatness of one who has long been regarded as the most distinguished man of science of modern times.

A LIFE of Lord Kelvin has been in preparation for some months by Prof. Silvanus Thompson, who was entrusted with this work, and to whom Lord Kelvin himself furnished numerous biographical details and other matter for the purpose. It will be published in the course of next year by Messrs. Macmillan and Co., Ltd.

THE Prince of Wales was elected an honorary member of the Royal Irish Academy at the last meeting of the academy. In the case of the election of a member of the Royal Family the election is by resolution, which was moved by the Earl of Aberdeen, Lord Lieutenant, who is the visitor of the academy, and seconded by Mr. D. H. Madden, Vice-Chancellor of the University of Dublin.

SIR NORMAN LOCKYER, K.C.B., F.R.S., has been unanimously elected president and an honorary member of the Penzance Natural History and Antiquarian Society in recognition of his services to the study of the circles and other prehistoric remains in west Cornwall.

M. EDOUARD CUYER has been elected president of the French Anthropological Society for 1908.

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Two lectures suitable for a juvenile audience will be delivered for the Society of Arts on January 1 and 8, 1908, at 5 p.m., by Mr. F. Martin Duncan, on "The Scientific Applications of the Kinematograph."

A COURSE of six lectures on the geographical distribution of rainfall in the British Isles will be given by Dr. H. R. Mill in the map room of the Royal Geographical Society on Thursday evenings in January and February, 1908, beginning January 23 at 5.30 p.m.

PROF. R. W. WOOD, professor of experimental physics in the Johns Hopkins University, has been awarded, *Science* states, the John Scott legacy premium and medal of the Franklin Institute of Philadelphia for his discoveries in colour photography.

THE Russian Physico-chemical Society has arranged to hold a conference of general and applied chemistry in honour of Mendeléeff at the beginning of January, 1908, at the University of St. Petersburg. Several discourses will be delivered on the great chemist's life and works. We learn also from the *Revue scientifique* that the journal *Russj* has inaugurated a subscription for the purchase of a Mendeléeff House, which, like the Hofmann House in Berlin, would be used for the meetings of learned societies.

THE eleventh International Congress of Navigation will be held at St. Petersburg from May 31 to June 7, 1908, under the patronage of the Emperor of Russia. The previous meetings were held at Brussels, in 1885; Vienna, 1886; Frankfurt-on-the-Main, 1888; Paris, 1889; Manchester, 1890; London, 1891; Paris, 1892; the Hague, 1894; Brussels, 1898; Paris, 1900; Dusseldorf, 1902; Milan, 1905. Arrangements have been made for communications and discussions on several questions relating to inland and maritime waterways, including the industrial and agricultural utilisation of rivers, and for scientific excursions and inspections of some of the rivers, canals, and sea ports in Russia. The address of the general secretary of the congress is 7 Ismailovsky Prospect, St. Petersburg.

THE current number of the *Revue Scientifique* contains an account of "La Caisse des Recherches scientifiques." The fund was founded by law on July 14, 1901, on the proposition of M. Audiffred, with the double object of assisting medical science in its researches and of providing financial assistance to original workers in pure science. The fund receives from the French Government an annuity of 5000*l.*, and at its inauguration M. Audiffred gave 2400*l.* The idea of the fund has not proved altogether popular, for in 1906 the Caisse des Recherches received general donations to the extent only of just under 200*l.* But there has been considerable improvement this year, and it is anticipated that the amount will be much larger; the Paris Municipal Council itself gave 200*l.*, and several general councils have given small sums. Since its creation the Caisse has distributed more than 24,100*l.*, of which about 1000*l.* only was available for work in other than medical and biological science. M. Rigaut may well say that these sums are wholly inadequate so far as the needs of science are concerned.

PROF. ASAPH HALL, whose death we announced last week, will always be remembered as the discoverer of the satellites of Mars, since the sensational character of the discovery appealed powerfully to the public mind; but in many ways he accomplished much useful work in every department of astronomy, and exhibited an industry which placed him in the forefront of American astronomers.

Diligence and energy were his principal characteristics from the time when he entered Harvard Observatory, as a junior, fifty years ago, until he retired from the honoured position of professor of astronomy in 1901. The greater part of his work, however, was accomplished at Washington, and it is difficult to say what department of astronomy he did not enrich. He was one of the earliest to appreciate the value of the observations of Mars as a means for deriving the solar parallax, and he took part in solar eclipse expeditions for physical work on the sun. His observations of planets, whether for position or for surface detail, were frequent and accurate. He was an industrious observer of double stars, and his work on stellar parallax, as well as in the determination of the relative positions of stars in clusters, is well known. On the theoretical side of astronomy he contributed papers on the secular perturbations of the planets, the computation of orbits, and many similar problems. As a geodetist, the value of his work in the determination of longitudes and on the employment of the occultation method has long been recognised. His career was that of a typical practical astronomer, and the recognition of his work was shown by his election into many learned societies. He was both gold medallist and foreign associate of the Royal Astronomical Society.

THE subject of river pollution from the naturalists' point of view was introduced by Prof. R. Meldola, F.R.S., at a largely attended conference meeting, convened under the auspices of the Essex Field Club, and held in the Municipal Technical Institute, Stratford, on Saturday, December 14. The Mayor of West Ham was in the chair at the beginning, and subsequently the president of the Essex Field Club (Mr. Miller Christy). Among other speakers upon the subject were Mr. E. B. Barnard, M.P. (chairman, works committee, London Water Board), Mr. David Howard, J.P. (past-president Society of Chemical Industry), Dr. Parsons (Local Government Board), Sir Alexander Pedler, K.C.I.E., F.R.S. (hon. secretary, British Science Guild), Sir William Ramsay, K.C.B., F.R.S. (president Chemical Society, and chairman Royal Commission on Sewage Disposal), Dr. Sanders (medical officer of health, county borough of West Ham), Dr. Somerville (lecturer on public health, King's College, London), and Dr. J. C. Thresh (medical officer of health, Essex County Council). At the close of the meeting the following resolution was moved by Sir Alexander Pedler, seconded by Mr. E. B. Barnard, carried unanimously, and ordered to be transmitted to the Local Government Board and the British Science Guild:—"That this meeting, having heard the expert testimony of many qualified speakers interested in the improvement of the state of our rivers, streams, and water-ways, it is of opinion that legislative action is urgently needed, and would regard with satisfaction the creation of a central authority under Government for dealing with the general question of water supply throughout the kingdom, as well as with the disposal of sewage and of effluents from factories; such central authority to be given power to apportion expenditure on sewage treatment or other necessary work of purification amongst the communities deriving benefit from such expenditure."

British Birds for November contains an excellent portrait of the late Mr. Howard Saunders to illustrate an obituary notice by Mr. Abel Chapman. The portrait is also published separately by Messrs. Witherby and Co., price 1s. 6d. The other contents include a paper by Dr. E. Hartert on races of birds peculiar to the British Islands,

and a note by Mr. N. F. Ticehurst on the capture in Romney Marsh of a specimen of the American sandpiper, *Ereunetes pusillus*, this being apparently the first record of the species in Europe.

To the *Times* of December 14 Sir T. Digby Pigott communicates an account of a luminous bird—believed to be an owl—recently seen at night in Norfolk. The idea that the "powder-down" patches of certain birds are luminous has been held, we believe, in America, but is generally discredited by ornithologists. The circumstantial account of the Norfolk bird may, however, lead to a reconsideration of the evidence, although we cannot admit that the name *Strix flammea* has anything to do with the alleged phenomenon, as it almost certainly refers to the colour of the feathers of the back. The story that the heron emits a phosphorescent light in order to attract fish also seems "shaky," seeing that the bird is diurnal in habits.

At the close of a paper published in the November issue of the *Quarterly Journal of Microscopical Science* on the muscles of the head in birds (as exemplified by the domesticated fowl) and reptiles, Prof. H. F. Edgeworth attempts to formulate the leading anatomical features of the common ancestor of those two groups. The list is too long and too technical to be quoted here, but it may be noticed that in certain respects the author finds that birds have more in common with chelonians than with any other group of reptiles. "These features of resemblance suggest at first sight a very distant chelonian relationship for birds, but are in reality very ancestral traits, which are also present in embryonic stages of other sauropsidan groups. The secondary fixation of the pterygo-quadrate and atrophy of the elevator of the pterygoid process, which occur in Chelonia, are strongly marked differences from birds."

In connection with the preceding note, reference may be made to a paper by Dr. W. Sippel on the structure of the roof of the mouth in birds and mammals, published in vol. xxxvii., parts ii. and iii., of *Gegenbaur's Morphologisches Jahrbuch*. The greater portion of the paper is devoted to the soft-parts of the palate, and it is shown at the conclusion that in homologising the constituent elements of this region in birds and reptiles several misidentifications have been made by previous workers. The long, posteriorly widened median slit in the palate of the bird does not, for instance, represent the secondary choanæ, but rather the orbito-subchoanal cleft. The paper concludes with a comparison of the bones of the palate in reptiles, birds, and mammals, as illustrated by the monitor, the duck, and the dog, and here, too, some important differences distinguishing this region in the three classes are indicated.

In the December number of the *Popular Science Monthly* Prof. Bashford Dean gives his impressions of the chief museums of Asia, as gathered during a recent eastern tour. Among the institutions referred to is the Raffles Museum and Library at Singapore, of which the author writes in terms of high commendation, the Colombo City Museum, the Madras Museum, and the Indian Museum, Calcutta. Dr. Willey's arrangement of groups of animals to give an adequate idea of the wild life of Ceylon is regarded as one of the great features of the Colombo Museum, while, under Mr. E. Thurston's administration, the institution at Madras is described as one of the most successful of its kind in India. The Calcutta establishment must, however, stand at the head

of all the museums of Asia, its success, in the author's opinion, being very largely due to the policy of selecting as directors men eminent, not only in science, but in administrative ability. Reference may also be made to an interesting article in the same issue on the origin of slavery among ants, by Dr. W. M. Wheeler.

THE training of foresters for India and the organisation of the scientific work of the department form the subject of a leading article in the *Indian Forester* (September), in which the writer points out the necessity for a systematised programme arranging for the compilation of forestry data and research. An article on improvement fellings is concerned with the problem of increasing the growing stock of teak. Premising that many saplings are killed by creepers and faster growing trees, the author, Mr. H. C. Walker, adduces arguments and statistics in favour of taking measures for saving young teak trees by a judicious system of thinning.

AMONG the experimental work referred to by Mr. W. Fawcett, director of the Public Gardens and Plantations, Jamaica, in his annual report for the year 1906-7, the raising of selected seedling sugar canes and the cultivation of Havana and Sumatra tobacco are of primary importance. It is recorded that as a result of comparative experiments a better yield of coffee has been obtained at the Hope Gardens under shade than without shade, and preference is given to the guango, *Pithecolobium saman*. The satisfactory results attending the instruction of small landholders by travelling instructors are noteworthy; by this means, as also by the establishment of agricultural banks and prize-holding schemes, the agricultural population is developing an appreciation for improved methods of cultivation.

MUCH valuable information on insect pests attacking crops is being disseminated by the Bureau of Entomology, forming part of the United States Department of Agriculture. In Bulletin No. 68, part iii., Mr. A. L. Quaintance deals with the trumpet leaf-miner of the apple, *Tischeria malifoliella*, a Tineid moth that is destructive to species of *Cratægus* and *Pyrus*. The mines are burrowed by the larvæ in the palisade layers of the leaf. Spraying with kerosene emulsion is recommended for destroying the larvæ and pupæ. Mr. A. A. Girault describes the life-history of the lesser peach-borer in Bulletin No. 68, part iv. The species, formerly referred to *Sesia*, a genus of moths of the family Sphingidæ, now receives the name of *Synanthedon pictipes*. It occurs principally on plum and peach trees, and must be distinguished from the better-known peach-borer, *Sanninoidea exitiosa*.

IN his annual address to the Australasian Association for the Advancement of Science, Dr. A. W. Howitt gives an account of his reminiscences of Central Australian exploration, and in particular of the search for the ill-fated members of the Burke-Wills expedition. The causes of the failure of this enterprise lay, he shows, in the extravagant amount of supplies provided, for which carriage was inadequate, in the impetuosity of the leader, and in want of cooperation on the part of certain members of his staff.

THE second number of the Journal of the revived Gypsy Lore Society, with its headquarters at 6 Hope Place, Liverpool, contains a reprint, revised by the author, Mr. C. G. Leland, of an article on the remarkable dialect known as Shelta, spoken by wandering tinkers, and apparently of Celtic origin. This is a preliminary to a

further study of this dialect. Mr. J. Sampson gives an interesting account of his experiences with a gang of German Gypsies at Blackpool. Mr. D. MacRitchie has collected much curious information to prove that throughout eastern Europe the Gypsies were formerly subjects of certain great noblemen, not of Gypsy race, who were appointed to that position by the rulers of those countries. Mr. W. M. Gallichan furnishes a report on the Gypsies of Andalusia, Mr. B. Gilliat-Smith on those of the Rhine Province, and Dr. T. R. Gyorjevic on those of Bosnia. A collection of interesting miscellaneous notes completes an excellent number, which has as its frontispiece a portrait of that eminent Gypsy scholar, Dr. A. G. Paspatis.

THE *Reliquary*, under the editorship of Dr. J. C. Cox, in succession to the late Mr. J. Romilly Allen, continues to be one of the most scholarly of our archæological publications. In the last quarterly number, issued in October, one of the most interesting articles is that by Mr. G. Le Blanc Smith on some dragonsque forms on, and beneath, fonts. Numerous examples of such a form of decoration are found in Sweden, but some in this country are equally interesting. One favourite type is that of the salamander, which is always represented as a lizard with bifurcated tail, in which there is one coil or twist. It has two legs set very far back on its body, a rather humped back covered by a pair of wings, longish ears, and a dragon-like head. In many cases the body of the animal is covered with scales, and the wings are clothed with feathers. The toes or claws are invariably three in number. Its countenance bears a look of loathing or disappointment, the symbol of its defeat as representing the powers of evil by the baptismal rite. The best examples of such figures are found on fonts at Norton and Youlgreave, both in Derbyshire. The second type represents dragons or grotesque monsters, humbled and abased, grovelling under the font itself, of which they form the base. Such are the fonts at Hereford Cathedral and at Castle Froome, in Herefordshire. A curious development is that at Ashford, where the animal is carved as though it actually protruded through the shaft of the font—the head at one side, the curly tail at the other. Mr. Le Blanc Smith asks for aid in discovering similar representations of monsters in other parts of the country.

A PAPER on the predetermination of train-resistance was read by Mr. C. A. Carus-Wilson before the Institution of Civil Engineers on December 10. Among the practical conclusions arrived at are that the resistance of the air with a train of bogie-coaches, running at sixty miles per hour, amounts to about one-half the total tractive effort required to haul the train. Experiments conducted by the St. Louis Electric Railway Test Commission show that a large reduction can be made in the front and rear air-resistance by shaping the ends, and that by this means a saving can be effected of 10 per cent. of the total tractive effort with a long passenger train, and 30 per cent. with a single coach.

A COLONIAL OFFICE report (Cd. 3794) has been issued giving Major E. H. Hill's report on the Survey Department of British East Africa. The work at present in progress is the main triangulation of the country. Major Hill says that an additional section of two officers and six or eight surveyors is imperative to prepare topographic maps before the trigonometrical beacons are destroyed. He recommends that topographic maps should be issued on the scale of 1 to 125,000. He discusses a proposal for a school to train African natives for the survey work; but

he regards the natives of British East Africa as at present quite useless for this purpose, while those trained on the west coast could not be employed in the highlands of East Africa. Indian natives are being employed, but have not proved altogether satisfactory.

REVIEWING the world's tin-mining industry, Mr. A. Selwyn-Brown, in the *Engineering Magazine* (vol. xxxiv., No. 2), shows that the world's production of tin last year was 96,196 tons. The active tin-mining fields are few in number, and, as a rule, not in a very prosperous condition, notwithstanding the high value of tin and the large existing demand for it. The alluvial deposits in the Dutch East Indies and in the Malay States are approaching exhaustion, and difficulties are being caused by the scarcity of coolie labour. Bolivia is advancing its consumption, but it is upon Australia and Tasmania that consumers will have to depend for the principal part of their tin supplies, unless Africa should develop into a tin-mining country of importance.

A STRONG gale traversed Scotland and the north-east of England during Friday night and Saturday in last week. During its progress over our island the cyclonic system increased greatly in depth, the lowest reading of the barometer reported being 28.39 inches, at Spurn Head, at 8 a.m. on Saturday. The greatest strength of the wind was from the north-west, and was due to a sharp rise of the barometer in the rear of the disturbance. The heaviest part of the storm occurred over the southern portion of the kingdom, where considerable damage was occasioned, and wrecks, accompanied with loss of life, occurred in the English Channel. Heavy rain preceded the storm, and large tracts of land were flooded in the Midlands and in the southern districts. A fall of temperature was experienced after the passage of the storm area, and frost has occurred in several places.

In a lecture delivered before the meeting of German Naturalists and Physicians at Dresden in September last, Dr. E. Herrmann directed attention to his researches on the periodical variations of atmospheric pressure, and to the possibility of submitting the phenomena to numerical investigation. For this purpose he used the well-known daily synoptic weather charts of the North Atlantic Ocean and adjacent continents issued by the Deutsche Seewarte and the Danish Meteorological Institute. The diagrams which accompany his paper, a copy of which he has sent to us, seem to show that a succession of analogous phenomena occurs at regular intervals, and that areas of low and high barometric pressure follow each other at certain distances. He asserts that the periods exhibited are due to the moon's movements or to a combination of these with that of the sun. We remember that Sir J. Herschel stated that the moon's influence is "utterly insignificant as a meteorological cause." Nevertheless, Dr. Herrmann's paper may be considered as a painstaking endeavour to throw light upon the intricate processes involved in the general atmospheric circulation.

MR. GUSTAV FISCHER, of Jena, has just published the second edition of Prof. L. Jost's "*Vorlesungen über Pflanzen-physiologie*," the first edition of which was very favourably reviewed in *NATURE* of July 14, 1904 (vol. lxx., p. 242). The work has been translated into English, and a review of this edition appeared in *NATURE* of December 5 (p. 97).

A THIRD edition of "*Practical Forestry and its Bearing on the Improvement of Estates*," by Prof. Charles E. Curtis, has been published by Messrs. Crosby Lockwood

and Son. The work has been revised and also enlarged by the addition of an appendix on the planting of waste lands, a project which the author hopes may not only add to the wealth of the nation, but give employment to the rural population, and so keep them upon the land. It is pointed out in the volume that the management of our woodlands is improving, and that what was once a source of loss is becoming a source of profit.

THE twenty-third issue of "*Hazell's Annual*," that for 1908, is even more complete than previous editions. It is an alphabetically arranged, cyclopædic record of men and affairs designed especially to be of use in 1908. Articles are provided, for example, on the Olympic games, the Franco-British Exhibition, and on recent work in colour photography. The most important of the Blue-books published during 1907 are summarised, and among these abridgments likely to be of special assistance to readers of *NATURE* may be mentioned those dealing with agriculture, education, and sea fisheries. The busy worker in many departments of knowledge will find the annual a trustworthy and useful work of reference.

THOUGH it has not increased in price, "*Who's Who*" continues to grow in size. Messrs. A. and C. Black, the publishers of this work of reference, which may justly be described as indispensable, have this year added eighty-three pages of biographies, and the new volume contains 2040 pages. The biographical notices vary much in length, and, unfortunately, the longest notices are not always those of the most important persons; but, despite such inequalities, the book may be unreservedly recommended to those readers whose necessity it is to know something about the men and women who, for one cause or another, have become prominent in work or play. "*Who's Who Year-book, 1908*," is also larger than its predecessors, and its clearly arranged and exhaustive tabular matter will continue to be consulted by everybody desiring a minimum of trouble in the task of reference.

THE Rev. Robert Harley, F.R.S., has written an interesting biographical sketch of Robert Rawson, who achieved some distinction in the scientific world by his work in mathematics and on the dynamical stability of floating bodies. Rawson was originally a Midland miner whose mathematical ability attracted the notice of Stephenson and Prof. Eaton Hodgkinson. He became a teacher of mathematics at Manchester, and contributed several papers to the Literary and Philosophical Society of that city. In 1847 he was appointed the first headmaster of H.M. Dockyard School, Portsmouth, upon the recommendation of Prof. Hodgkinson, and he occupied this post for twenty-eight years, among the men who passed through the school during this period being Sir Philip Watts, K.C.B., F.R.S., Sir John Durston, K.C.B., and Dr. Francis Elgar, F.R.S. Rawson died in March, 1906, and was buried in Havant cemetery. Mr. Harley's appreciative account of his career is published by Messrs. J. Clarke and Co., 13 and 14 Fleet Street, E.C., and Messrs. Griffin and Co., Portsea.

IN the "*Day by Day*" Tellurian which Messrs. G. Philip and Son have submitted to us, a simple and novel means is used to preserve the constant direction of the terrestrial axis in the course of the revolution of the earth around the sun. The tellurian is intended to be suspended on a wall or some other convenient vertical plane. The sun and earth are represented by two globes connected by a rod upon a diagram showing the months and other divisions of the year. As the terrestrial globe is moved around the globe representing the sun, a heavy bob attached by thick wire to the axis is maintained vertical by the

attraction of gravity, and this constant direction enables the axis to be kept inclined at the same angle to the plane of the diagram throughout a revolution. The result is that the terrestrial globe only rotates on its axis once during a complete revolution. This is misleading, and it will be necessary for the teacher to explain that though the device illustrates the different aspects of the earth presented to the sun during the year on account of the constant inclination of the axis, it does not represent accurately the relation between the day and the year. With this reservation, the model may be found of service in teaching astronomical geography.

MESSRS. TAYLOR AND FRANCIS have now published the first part of the fourth volume on Rhynchota, by Mr. W. L. Distant, of "The Fauna of British India, including Ceylon and Burma." These volumes are published under the authority of the Secretary of State for India in Council, and edited by Lieut.-Colonel C. T. Bingham. The third volume on Rhynchota was reviewed in NATURE of July 5, 1906 (vol. lxxiv., p. 221). The present fasciculus gives an account of the homopterus families Membracidae and Cercopidae, and four subfamilies of the Jassidae. The second part—in the appearance of which there is likely to be some delay owing to the necessity of examining material at present contained only in certain Continental museums—will contain the remaining subfamilies of the Jassidae and an appendix to the whole work.

MESSRS. J. AND A. CHURCHILL have published a tenth edition of Valentin's widely known "Practical Chemistry." Prof. W. R. Hodgkinson has added to the present issue easy experimental work in the early chapters, on the composition of air and water, some carbon compounds, sulphur and sulphuric acid, exercises on quantitative analysis, volumetric analyses, and methods of ascertaining molecular weight. The microscopic structure of some common alloys has been illustrated by photographs, and the whole work revised and brought up to date. The volume now runs to 476 pages, and its price is 10s. net.

OUR ASTRONOMICAL COLUMN.

THE MAXIMUM OF MIRA, 1906.—Mr. Naozo Ichinohe, of the Yerkes Observatory, observed Mira, for magnitude, from October 10, 1906, to March 8, 1907, and publishes his results, with a curve, in No. 4219 of the *Astronomische Nachrichten* (p. 311, December 5). These show that the maximum brightness occurred on December 12, 1906, which was about seven days before the predicted date. This early date is confirmed by the results of other observers, which give December 13, 12, and 7 respectively.

A FURTHER OBSERVATION OF COMET 1907a.—A telegram to the Kiel Centralstelle from Prof. Wolf states that comet 1907a was re-observed at the Königstuhl Observatory on December 4. At 11h. 33m. on that date its position was $\alpha=3h. 23m. 40s.$, $\delta=+50^{\circ} 35'$, a little to the north-east of α Persei, and its magnitude was 12.5. The motion of the object was found to be in accordance with the ephemeris (*Astronomische Nachrichten*, No. 4219, p. 315, December 5).

SPECTROSCOPIC DETERMINATION OF THE ROTATION OF THE SUN.—In a paper published in No. 4, vol. xxvi., of the *Astrophysical Journal* (p. 203, November), Prof. Adams describes at some length the instruments and methods employed by him at the Solar Observatory, Mount Wilson, in a spectroscopic determination of solar rotation period, and, after discussing them, he compares his results with those obtained previously by Dunér and Halm.

In the lower latitudes of the solar disc the recent results agree very well with the values obtained by Dunér and Halm, but in higher latitudes they lie between those of the previous observers. The rate of change of the velocity with the latitude attains a maximum in latitude 30° , be-

coming less in higher latitudes, and almost disappearing beyond 70° . Twenty lines, lying between $\lambda 4190$ and $\lambda 4300$, and attributed to different elements, were employed in the research, and it was found that different lines gave different rotational velocities. The titanium line at $\lambda 4290.38$ gave a systematically low value, although it is an enhanced line, and might therefore be expected to have its origin in the higher levels of the solar atmosphere. Two lines of manganese, $\lambda 4257.82$ and $\lambda 4266.08$, gave a consistently high value. Two carbon lines and a line due to lanthanum give low values, thus agreeing with the conclusion that these two elements reside in the lower layers of the sun's atmosphere. There are no indications of a variable velocity for any one latitude during the fourteen months of observation (May, 1906, to June, 1907), and the results appear to show that the photographic method displays a considerable gain of accuracy over the visual method so far as accidental errors of measurement are concerned.

NEWLY DISCOVERED SPECTROSCOPIC BINARIES.—Bulletin No. 123 of the Lick Observatory announces the recent discovery of the variable radial velocities of ten stars. Two of these, α Carinae and ι Gruis, were found to be binaries on examining plates taken at Santiago; the other eight were discovered at Mount Hamilton. They are α , f , and d Tauri, γ Cameleopardalis, A Boötis, β Coronae, ξ Cygni, and ζ Cephei.

In the same Bulletin Mr. A. B. Turner publishes a set of elements, and a velocity curve, for the spectroscopic binary ω Draconis, showing the period to be 5.27968 days and the length of the semi-major axis of the orbit to be 2,632,300 km. The velocity of the system is -13.68 km., and the orbit appears to be nearly circular, its eccentricity being only 0.0107.

THE ASTROGRAPHIC CATALOGUE.—We have received from the Catania Observatory the first part of their contribution to the International Astrographic Catalogue. Catania undertook the region dec. $+46^{\circ}$ to dec. $+55^{\circ}$, and the present volume contains the results for the region dec. $+50^{\circ}$ to $+52^{\circ}$, R.A. oh. to 3h. In an introduction Prof. Riccò, the director of the observatory, describes the instruments employed—photographs of the astrographic equatorial and the micrometer appear as a frontispiece—and discusses the methods followed in the reduction of the plates. The positions (1900) of some 7000 stars are included in the present work.

STARS HAVING PECULIAR SPECTRA.—From the examination of Henry Draper memorial photographs, Mrs. Fleming has discovered a number of variable stars and other objects having peculiar spectra, particulars of which are given in Circular No. 132 of the Harvard College Observatory. The Harvard plates show that D.M. $+66^{\circ} 780$, given by Dunér and by Krüger as a fourth-type star, gives a spectrum at times which contains no bright lines, whilst at other times the spectrum contains H β bright; the intensity of the spectrum also varies in certain regions.

WEAKENED LINES IN SUN-SPOT SPECTRA.—In No. 3, vol. xxvi., of the *Astrophysical Journal*, Mr. Nagaraja, of the Kodaikánal Observatory, gives the wave-lengths of, and discusses, 167 lines which he has found to become weakened in passing from the spectrum of the photosphere to that of sun-spots. The photographs from which Mr. Nagaraja obtained his data were taken with a Rowland grating camera fitted up by Mr. Evershed, and include the region F-D. Considering the forty or so lines due to iron, titanium, and chromium given in this region as enhanced lines by Sir Norman Lockyer, and four more recently announced by Prof. Fowler, Mr. Nagaraja finds that the majority of them are weakened in spots.

Two enhanced lines of iron at $\lambda 5169.07$ and $\lambda 5169.22$, one enhanced titanium line ($\lambda 5188.87$), and two enhanced lines of chromium ($\lambda\lambda 5502.9$ and 5621.7) appear to be exceptions, however. With one exception ($\lambda 5284.281$, Ti), all the titanium and chromium lines weakened in spots are of the enhanced type. A comparison of the chromospheric and spot-weakened lines shows that only a fraction of the former are weakened in spots, and that a large number of the weakened lines belong to the higher levels of the chromosphere.